

Exhibit 21



The final BruxZir Solid Zirconia crown (tooth #9) on the day of cementation. (DTUPhoto Michael C. DiTolla, DDS, FAGD)

Sep 13, 2011 | GENERAL DENTISTRY

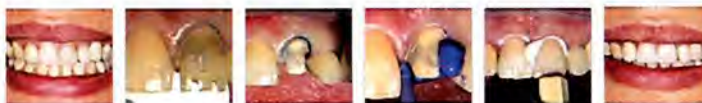
Anterior BruxZir Solid Zirconia Crown

by Michael C. DiTolla, DDS, FAGD, USA

BruxZir Solid Zirconia crowns and bridges were originally designed by Glidewell Laboratories as an esthetic alternative to posterior cast gold or metal occlusals. As dentists began placing BruxZir restorations and were satisfied with the results, they started to prescribe BruxZir for bicuspid. The lab realized it needed to increase the translucency of the material if dentists wanted to prescribe BruxZir in the anterior.

When Glidewell R&D was ready to test the material, I gave them an esthetic challenge we all face: the single-unit central incisor crown adjacent to a natural tooth. This article highlights the clinical steps for placing an anterior BruxZir restoration. For a crown that is 100 percent zirconia with no ceramic facing, I think the lab pretty much nailed it.

Anterior BruxZir Solid Zirconia Crown



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Figure 1

Tooth #9 is going to be prepped for a BruxZir crown. I chose this case because tooth #8 is a natural tooth, tooth #7 is an all-ceramic crown and teeth #10 and #11 are a PFM cantilever bridge. It will be a good test of how this light interacts with the BruxZir crown versus the natural tooth and two restorations.

After anesthetizing the patient with the STA System, I break the proximal contacts just enough to place the first of two retraction cords into the sulcus (Ultrapak Cord #00). Then I use the 801-021 bur to trace around the gingival margin before making my depth cuts: 2 mm at the incisal edge, 1.5 mm at the junction of the incisal and middle thirds and a 1 mm half-circle reduction at the gingival margin.

Depth cuts ensure that we get enough facial reduction to have an esthetically pleasing crown that is the same size as the adjacent natural tooth. This is difficult to achieve.

Figure 2

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My depth cuts are now finished, which allows me to fly through the rest of the prep because the gingival is essentially done. The incisal edge takes about 15 seconds, and the facial reduction is marked with a depth cut. I turn my handpiece speed to 5,000 RPM and shut the water off to dial in and smooth the margins.

Figure 3

At this point, the prep is essentially done. After I place the top cord (Ultrapak #2E), I have a final opportunity to get a great look at the prep. Typically, I spend about 45 seconds polishing the prep, especially the gingival margin. Once again, I turn the handpiece down to 5,000 RPM and the water off, using a red-striped fine grit 856-025 bur to give the prep a mirror-like finish.

Figure 4

I place on the prep a ROEKO Comprecap anatomic, which helps keep the retraction cord in place. Slightly wetting the inside before placing it keeps the tooth moist. I ask the patient to bite down for 8–10 minutes. The result is a sulcus that cannot be missed with an intraoral tip. (When your assistant pulls the top cord, look down from the incisal with a mirror to see what I mean.) The impression material flows into the sulcus. This level of detail enables the dental technician to build a proper emergence profile into the restoration.

Figure 5

I try in the BruxZir crown and find the fit to be acceptable. I decide to cement the restoration rather than bond it into place because I have sufficient prep length and it is not over-tapered. I use RelyX Luting Plus Cement because of its natural bond to dentin and simple cleanup. The inside of the crown is coated with Z-Prime Plus from Bisco to enhance the bond of the cement to the zirconia crown. A pinewood stick provides pressure while the cement sets.

Figure 6

This is the final BruxZir Solid Zirconia crown (tooth #9) on the day of cementation. It probably won't be mistaken for a natural tooth, but it blends well with the adjacent natural tooth (tooth #8).

When I compare it to the existing crowns in the anterior segment, I think the BruxZir crown looks better.

While I don't recommend that you jump into prescribing BruxZir for single-unit central incisors, this clinical anterior BruxZir Solid Zirconia crown cases demonstrates that this material is one step closer to being as well-suited for anterior restorations as it is for posterior restorations.

Editorial note: This article was originally published in Dental Tribune U.S., Vol. 6 No. 12, July 2011.

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Exhibit 22



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An anterior solid zirconia crown

Michael DiTolla, DDS, FAGD

For more on this topic, go to www.dentaleconomics.com and search using the following key words: *anterior solid zirconia crown, restorations, translucency, Dr. Michael DiTolla.*

BruxZir® Solid Zirconia crowns and bridges were originally designed by Glidewell Laboratories for use in the posterior to replace cast gold or metal occlusals when the patient did not want any metal showing in his or her mouth. As dentists began placing BruxZir restorations and were repeatedly satisfied with the results, they started to prescribe BruxZir for bicuspid as well. The lab realized it needed to increase the translucency of this material if dentists wanted to use it in the anterior.

Glidewell's R&D team members worked on this and told me when they were ready to test it. They asked me for an esthetic challenge, so I decided to give them the toughest one we all face: the single-unit central incisor crown adjacent to a natural tooth. The photos show the clinical steps for this anterior BruxZir crown. For a crown that is 100% zirconia with no ceramic facing, I think the lab pretty much nailed it.

Figure 1: Tooth No. 9 is to be prepped for a BruxZir Solid Zirconia crown. I chose this case for a couple of reasons. First, tooth No. 8 is a natural tooth, and will be a good test of how the light interacts with the BruxZir restoration versus the natural tooth. Second, tooth No. 7 is an all-ceramic crown, which will be replaced later, and teeth Nos. 10 and 11 are a PFM cantilever bridge. So, we can also compare the BruxZir crown to those two restorations.



Figure 2: At this point, depth cuts are finished: 2 mm at the incisal edge, 1.5 mm at the junction of the incisal and middle thirds, and a 1 mm half-circle reduction at the gingival margin. This lets me fly through the rest of the prep because the gingival is essentially done. The incisal edge takes about 15 seconds, and the facial reduction is marked with a depth cut. There is no guessing about how much to reduce.



Figure 3: At this point, the prep is essentially done. When the top cord is in place, you have a final opportunity to get a great look at the prep. Typically, I spend about 45 seconds polishing the prep, especially the gingival margin. I again turn the handpiece down to 5,000 RPM and the water off, and I use a red-striped fine grit 856-025 bur to give the prep a mirrorlike finish.

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Figure 4: The result of leaving the top cord in for eight to 10 minutes is a sulcus that cannot be missed with an intraoral tip. I am pretty sure I could fling alginate into the sulcus from the other side of the operator and still get a good impression. When your assistant pulls the top cord, look down from the incisal with a mirror to see what I mean. You will see the impression material flow into the sulcus.



Figure 5: I try in the BruxZir Solid Zirconia crown on tooth No. 9 and find the fit to be acceptable. The patient has approved the esthetics, so we clean it out prior to cementation. I decide to cement the restoration rather than bond it into place because I have sufficient prep length and it is not overtapered. I use RelyX™ Luting Plus Cement (3M ESPE; St. Paul, Minn.) because of its natural bond to dentin and simple cleanup. A pinewood stick is used to provide pressure while the cement sets. The inside of the crown is coated with Z-Prime Plus from Bisco to enhance the bond of the cement to the zirconia crown.



Figure 6: This is the final BruxZir Solid Zirconia restoration on tooth No. 9 on the day of cementation. It probably won't be mistaken for a natural tooth, but it blends well with the adjacent natural tooth, tooth No. 8. When I compare it to the existing all-ceramic and PFM crowns in the anterior segment, I think it looks better, although those other crowns are a few years old. While I don't recommend that you jump into prescribing BruxZir for single-unit central incisors, I think BruxZir is one step closer to being a material that is as well suited for anterior restorations as it is for posterior restorations.



Dr. Michael DiTolla is the Director of Clinical Research and Education at Glidewell Laboratories in Newport Beach, Calif. He lectures nationwide on both restorative and cosmetic dentistry. Dr. DiTolla has several free clinical programs available online or on DVD at www.glidewell.com.

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